[10537/300]

METHOD FOR ADJUSTING THE TEMPERATURE OF A MOTOR VEHICLE SEAT

The invention relates to a method for adjusting the temperature of a motor vehicle seat according to the precharacterizing clause of patent claim 1.

One of the main objectives when designing a vehicle interior is to provide the occupant of a motor vehicle with optimum seating comfort. Special attention is directed here to the thermo-physiological comfort by regulating the transportation of heat and moisture. No other component of the motor vehicle is in contact over such a large surface area and consistently with the occupant as the motor vehicle seat. Accordingly, a healthy and comfortable micro-climate is important between the seat surface and the occupant, this micro-climate having a positive effect on the mental and physical fitness of the occupant.

DE 198 51 979 C2 discloses a vehicle seat, in which, in order to set a comfortable seat climate, a control unit is provided which is connected on the input side to a temperature sensor for recording the temperature of the seat surface, the "integral sensor", and a moisture sensor, and is also connected on the output side to electric switching circuits of a seat heater and seat ventilating system. The control unit is additionally connected on the input side by an outside temperature sensor for measuring the ambient temperature. A temperature adjusting system is integrated in the control unit and adjusts the surface temperature of seat cushion and backrest cushion to a predetermined desired value by means of the seat heater and seat ventilating system. In this case, the desired value is corrected in the control unit as a function of the temperature value supplied by the outside sensor. The correction here can take place in such a manner

that, at an outside temperature of below 20°C, the desired value is set to, for example, 36°C, and at an outside temperature of above 20°C, the desired value is lowered to, for example, 35°C. With this means of influencing the temperature which is to be adjusted at the seat surface, the seat user's perception of temperature depending on the time of year is taken into account.

The invention is now based on the object of indicating a method for adjusting the temperature of a motor vehicle seat, comprising a seat ventilating system and a seat heater, to a predetermined desired value Tdes, in which the temperature Ts of the motor vehicle seat is detected in the region of the seat surface by a first temperature sensor and the outside temperature Ta is detected by a second temperature sensor, which ensures, for an occupant, a permanently comfortable, warm and dry micro-climate between him and the seat surface.

The object is achieved by a method for adjusting the temperature of a motor vehicle seat, comprising a seat ventilating system and a seat heater, in accordance with the features of patent claim 1.

According to the invention, in order to adjust the temperature Ts of a seat, a seat ventilating system is switched off below a first temperature threshold Ta1 for the outside temperature Ta, and a seat heater is switched off above a second temperature threshold Ta2 for the outside temperature Ta. At low outside temperatures Ta (below the first temperature threshold Ta1 the adjusting system operates in "winter mode"), the temperature Ts of the seat is therefore set only by the seat heater and without the seat ventilating system whereas, at high outside temperatures Ta (above the second temperature threshold Ta2 the adjusting system operates in "summer mode"), the temperature Ts of the seat is set only by the seat

ventilating system and without the seat heater. In the temperature interval for the outside temperature Ta between the two temperature thresholds Ta1 and Ta2, both the seat heater and the seat ventilating system can generally be used to adjust the temperature Ts of the seat. Experiments at low outside temperatures Ta show that when seat ventilating system and seat heater are activated in parallel by an occupant, a cool air draft is felt at least in the upper body region. A large portion of the air fed into the motor vehicle seat by the seat ventilating system disappears from the backrest of the motor vehicle seat via the shoulder region of the occupant. The dry air supplied absorbs some of the moisture from the occupant's skin surface, resulting in an unpleasantly cool sensation for the occupant. A sensation which is perceived by the occupant as being entirely positive during summer weather conditions proves problematic at lower outside temperatures Ta. If the supply of air is constricted, the cool sensation is perceived as being no longer so negative. During winter mode without use of the seat ventilating system, the occupant no longer has the unpleasantly cool sensation, and the occupant obtains an unlimited pleasant sensation. At higher outside temperatures Ta, with the seat heater and seat ventilating system operating together to adjust the temperature Ts of the seat, sweating which is perceived as being unpleasant by the occupant starts. The best well-being for the occupant is obtained if the seat heater is not used in the summer mode. With the present method, comfortable cushion temperatures which lie in the region of the normal skin temperatures are achieved in winter and in summer. The clothing and the skin of the occupant remain dry even under extreme climate conditions. A permanently comfortable, warm and dry micro-climate is achieved between the seat surface and the occupant.

In one refinement, the value for the first temperature threshold Ta1 is set to be equal to the value for the second temperature threshold Ta2. In particular, this common value is approx. 18°C. This makes it possible to completely omit a transition region permitting a parallel use of seat heater and seat ventilating system, as a result of which the adjustment of the temperature Ts of the seat is considerably simplified. In order to set the temperature Ts of the seat, use is made, depending on the outside temperature Ta, in other words in summer or in winter mode, of only the seat ventilating system or the seat heater.

Further advantageous refinements of the invention are reproduced in the subclaims.

The invention is explained in more detail in the single figure with reference to a number of exemplary embodiments, the figure showing a detail from a block circuit diagram for adjusting the temperature Ts of a motor vehicle seat comprising a seat ventilating system and a seat heater.

According to the figure, in the case of a method for adjusting the temperature Ts of a motor vehicle seat to a predetermined desired value Tdes which can be set via a control device (not illustrated further), the temperature Ts of the seat is detected in the region of a seat surface (not illustrated further) by a first temperature sensor 2 and is compared with the desired value Tdes. In addition, the outside temperature Ta is measured with a second temperature sensor 4 and is compared with a threshold value Tax for the outside temperature Ta.

The deviation Tdes-Ts between the predetermined desired value Tdes and the temperature Ts of the seat is processed by a first controller 6 for a seat heater 8 or by a second

controller 10 for a seat ventilating system 12. Either the seat heater 8 is set in accordance with an output variable of the first controller 6 or the seat ventilating system 12 is set in accordance with an output variable of the second controller 10 as a function of the switching position of a switch 14 with a temperature-dependent switching function.

The temperature-dependent switching function of the switch 14 is configured in such a manner that, below a predetermined threshold value Tax for the outside temperature Ta, a "winter mode", only the seat heater 8 is set with the adjusting system via the first controller 6. The seat ventilating system 12 is switched off in winter mode. Above the predetermined threshold value Tax for the outside temperature Ta, a "summer mode", only the seat ventilating system 12 is set with the adjusting system via the second controller 10. The seat heater 8 is switched off in summer mode. In tests, a temperature value of approximately 18°C has proven worthwhile as the threshold value Tax. A delimitation between winter and summer mode at this threshold value Tax for the outside temperature Ta is perceived as being particularly pleasant by occupants. The threshold value Tax may be varied as a function of individual perception. Furthermore, by deactivating the adjusting system, a manual actuation of seat heater 8 and seat ventilating system 12 is ensured.

In one exemplary embodiment (not illustrated further), the threshold value Tax for the outside temperature Ta is divided into a first temperature threshold Ta1 and a second temperature threshold Ta2 with Ta1 smaller than Ta2. The seat ventilating system 12 is switched off below the first temperature threshold Ta1, and the seat heater 8 is switched off above the second temperature threshold Ta2. The winter and summer mode is separated by the temperature interval between the two temperature thresholds Ta1 and Ta2 in which a

mixed mode is possible. In the temperature interval, seat heater 8 and seat ventilating system 12 can be used in parallel for adjusting the temperature Ts of the seat in order to improve the seating comfort for the occupants. However, an individual operation of seat heater 8 and seat ventilating system 12 is also possible in this temperature interval bounded by the temperature thresholds Ta1 and Ta2.

In the exemplary embodiment illustrated in the figure, the value for the first temperature threshold Ta1 is therefore selected to be equal to the value for the second temperature threshold Ta2 as a special case.

The predetermined desired value Tdes for the temperature Ts of the seat has a value in the temperature range between 32.5°C and 35.5°C which corresponds to the individual well-being of the occupant and can be set individually. Irrespective of the outside temperature Ta, occupants in each case prefer a narrow temperature range for the temperature Ts of the seat, which they perceive as being pleasant. This generally lies in the given temperature range of between 32.5°C and 35.5°C and is essentially independent of summer and winter mode.

In a further refinement of the method, the temperature Ts of the seat can be adjusted to an upper desired value Tdesu below the first temperature threshold Ta1 for the outside temperature Ta, and the temperature Ts of the seat can be adjusted to a lower desired value Tdesl above the second temperature threshold Ta2 for the outside temperature Ta, the lower desired value Tdesl being smaller than the upper desired value Tdesu. Both desired values Tdesl and Tdesu lie in the temperature range between 32.5°C and 35.5°C. Account is therefore taken of the personal finding that in summer mode a somewhat cooler temperature Ts of the seat is preferred than

in winter, as a result of which a freshening effect is obtained.

With the indicated method, the occupant is provided with a comfortable micro-climate in the seat region which to the greatest possible extent prevents unpleasant sensations in terms of feelings with regard to the thermo-physiological seating comfort.